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(54) **SYSTEM AND METHOD FOR SURVEILLANCE**

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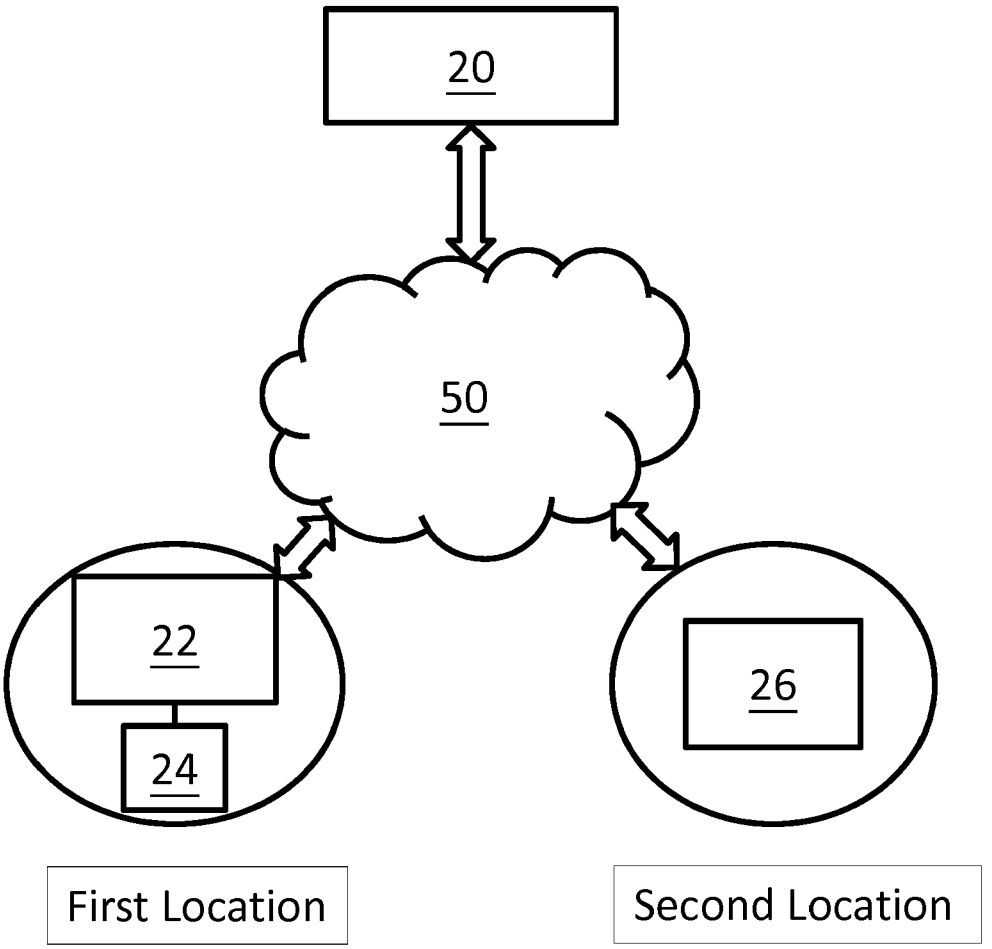
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(57) **ABSTRACT**

A plug-and-play surveillance system that can be set up by even computer-illiterates is disclosed herein. The system comprises an external storage device connected to a computing device and a monitoring device. A registration and matching service receives at least one unique identification code from the external storage device and the monitoring device and uses it to establish a unique pairing between the external storage device and the monitoring device. Subsequent communication between them can be directly established without the need of re-registration. The present invention provides a convenient surveillance system without complex setting and configuration. The present invention also provides higher privacy level and flexibility that additional features can be added to the system based on the user's need.



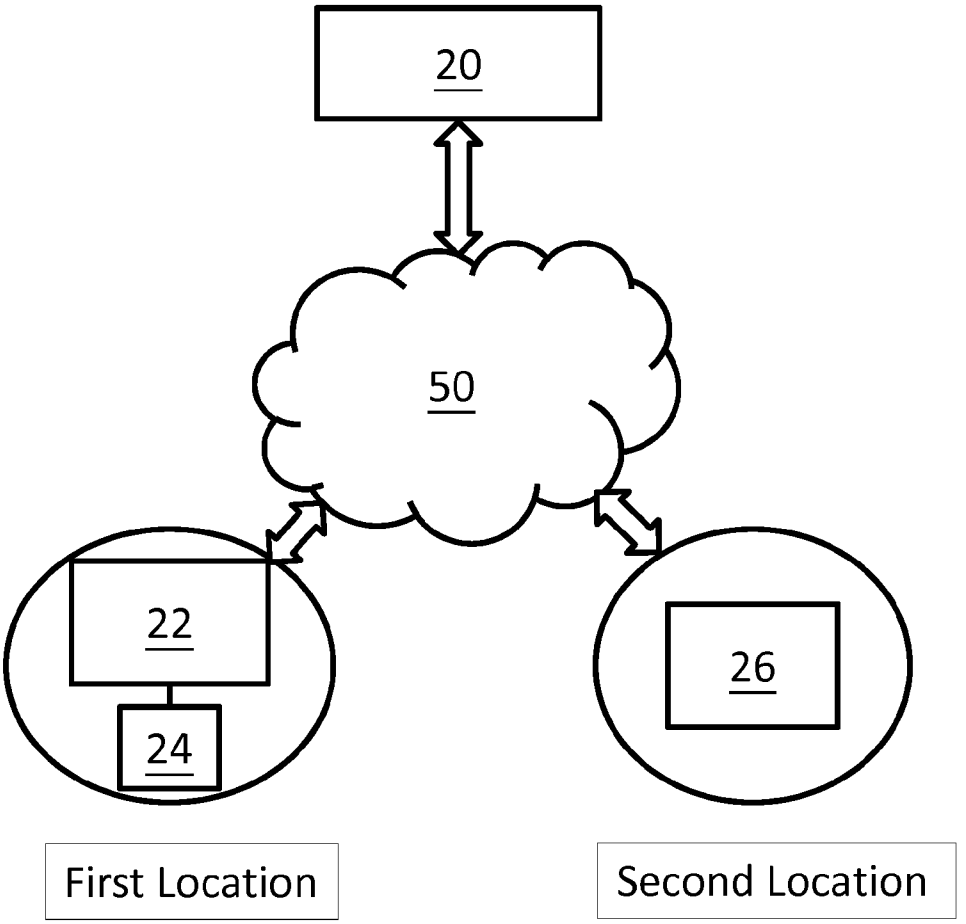


Figure 1

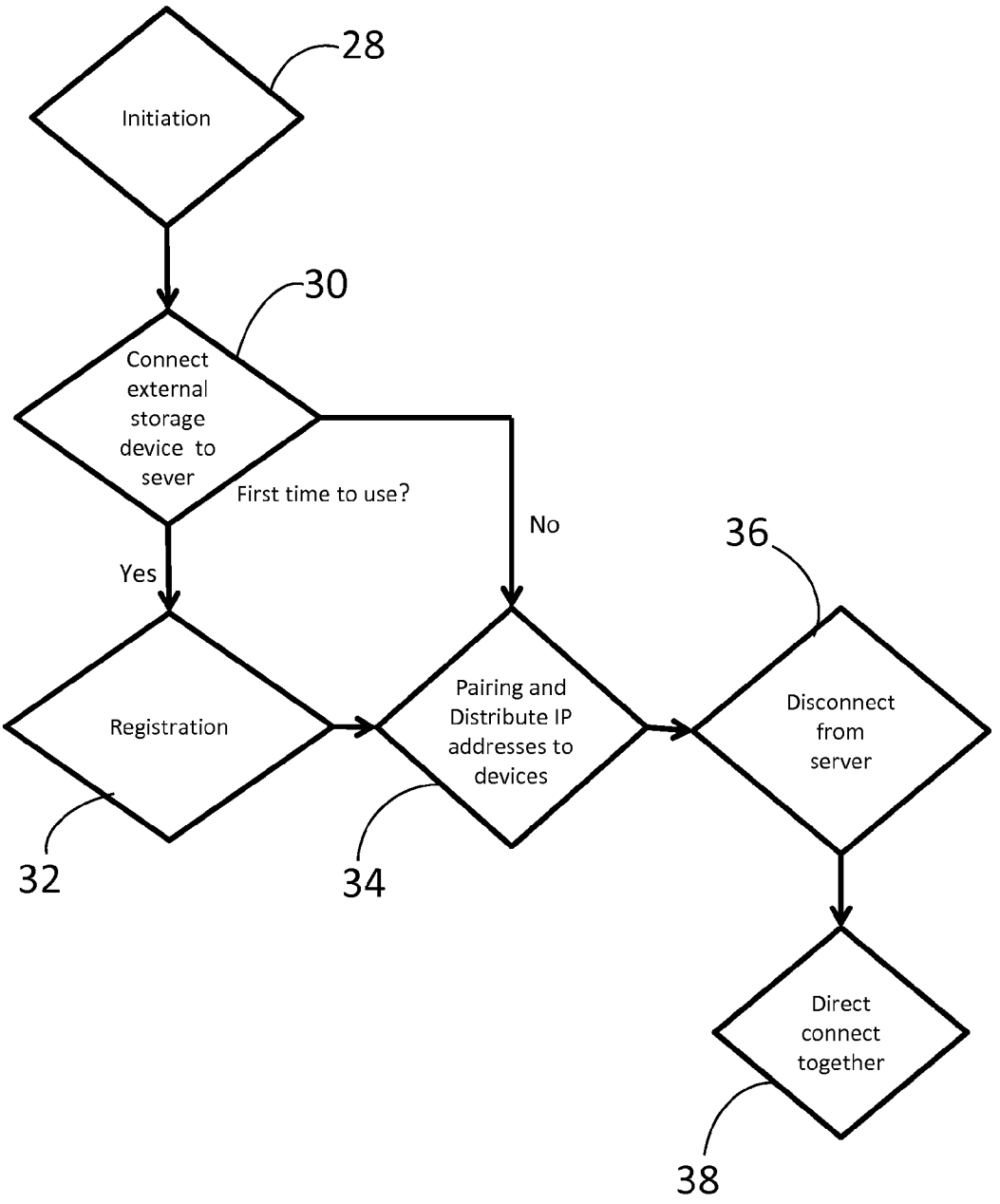

28
Initiation
30
Connect external storage device to sever
First time to use?
Yes
No
36
Registration
Pairing and Distribute IP addresses to devices
Disconnect from server
Direct connect together
32
34
38

Figure 2

SYSTEM AND METHOD FOR SURVEILLANCE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims benefit under 35 U.S.C. §119(e) of U.S. Provisional Application having Ser. No. 61438237 filed on Jan. 31, 2011, which is hereby incorporated by reference herein in its entirety.

FIELD OF INVENTION

[0002] This invention relates to a network monitoring system, and in particular a system for surveillance over a data communication network.

BACKGROUND OF INVENTION

[0003] Transmitting motion image through a data communication network is useful for domestic and industrial surveillance. However it may be difficult to install surveillance software. Under the Internet environment, for example, the monitoring station and the camera may need to go through various routers and firewalls. The steps of connecting the monitoring station to the IP camera may be complex and tedious, especially when the user is not familiar with how to circumvent firewall blockage. This may induce difficulties to the people without computer skill to use IP cameras, especially for the elderly. Security concern is another problem of the existing technique since personal data may be left on the computer being used.

SUMMARY OF INVENTION

[0004] In the light of the foregoing background, it is an object of the present invention to provide a system for surveillance without complex setting and configuration and provide a higher security level.

[0005] Accordingly, the present invention, in one aspect, is a plug-and-play surveillance system that can be set up by even computer-illiterates. The system comprises an external storage device connected to a computing device and a monitoring device. The external storage device is capable of exchanging data with a registration and matching service via the computing device through a data communication network. Also, the monitoring device is capable of exchanging data with the registration and matching service via the same data communication network. The registration and matching service receives at least one unique identification code from either the external storage device or the monitoring device and uses it to establish a unique pairing between the external storage device and the monitoring device. The pairing is stored in at least one of the devices so that subsequent communication between them can be directly established using the pairing without the need of re-registration.

[0006] In an exemplary embodiment of the present invention, the external storage device is a Universal Serial Bus (USB) storage device with a built-in program which is capable of controlling all setting and configuration of the surveillance system. The USB storage saves all data generated by the surveillance system.

[0007] In another exemplary embodiment, the monitoring device is a camera that can capture video and audio and is capable of adding additional features based on user's needs. The additional features can be temperature sensor, motion sensor, humility sensor, alarm and reminder, etc. Two-way interactions between the external storage device and the monitoring device can be achieved by adding suitable features to the monitoring device.

[0008] According to another aspect of the present invention, it is a method for surveillance over a data communication network. The method comprises the steps of (a) linking an external storage device via a computing device to a registration and matching service through a data communication network; (b) connecting a monitoring device to said registration and matching service via said data communication network; (c) receiving at least one unique identification code from said external storage device and said monitoring device; (d) establishing a unique pairing between said external storage device and said monitoring device based on said at least one unique identification code; and (e) storing said pairing in at least one of said devices.

[0009] There are many advantages in the present invention. First, it is easy to use and no complex setting is needed, even for the people without computer skills. Personal privacy can be protected by the present invention. Moreover, the present invention can be used as an alarm system.

BRIEF DESCRIPTION OF FIGURES

[0010] FIG. **1** is an overview of the surveillance system in one embodiment.

[0011] FIG. **2** is a flow chart of the surveillance system when the external storage device is activated in an exemplary embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] As used herein and in the claims, "comprising" means including the following elements but not excluding others. "Couple" or "connect" refers to electrical coupling or connection either directly or indirectly via one or more electrical means unless otherwise stated.

[0013] The embodiments described herein discuss how the inventive ideas are realized in an Internet environment wherein a user uses an external storage device with a built-in program to connect to a monitoring device in a remote location. A person skilled in the art can modify the details to implement the idea in other fields of technology, and would still fall in the scope of the present invention.

[0014] Referring now to FIG. **1**, the first embodiment of the present invention is shown. FIG. **1** is an overview of the surveillance system. Basically, in this embodiment, there are three components in the surveillance system, which are an external storage device **24** connected to a computing device **22** at the first location, a monitoring device **26** at a second location and a registration and matching service **20**. The computing device **22**, monitoring device **26** and the registration and matching service **20** are interconnected to each other via the Internet **50** so they can exchange data freely across the network. The computing device **22** and, the monitoring device **26** may pass through one or more routers/firewalls before connecting to the Internet **50**. Such routers/firewalls are not shown in the figure for clarity. The external storage device **24** has a built-in program which will be automatically loaded and executed when the user plugs it into the computing device **22**. Hence, the user needs not to install any program or software in order to use the surveillance system.

[0015] In one embodiment, the registration and matching service **20** can be provided by a server and the server holds a

website for registration. In other words, the registration and matching service **20** provides a registration service for the user. Furthermore, the registration and matching service **20** has a software module that provides matching service between the external storage device **24** and the monitoring device **26** (details of the registration and matching operations will be discussed later). After matching, the software module will distribute the IP addresses of the computing device **22** to which the external storage device **24** is connected and the monitoring device **26** to each other so that the external storage device **24** and the monitoring device **26** can directly communicate subsequently.

[0016] The monitoring device **26**, in an exemplary embodiment, has a unique identification code such as the serial number of the device. The monitoring device **26** also has a built-in program that stores a pre-determined Uniform Resource Locator (URL) directed to web site that provides the registration and matching service **20**. In one embodiment, when it is connected to the Internet **50**, it obtains an IP address from a DHCP (Dynamic Host Configuration Protocol) server of a router in the Internet **50**. And the monitoring device **26** will automatically link and send its unique identification code to the registration and matching service **20** using the predetermined URL and send its unique identification code to the registration and matching service **20**. Therefore it is not needed for a user to set the IP address of the monitoring device **26**. This is another advantage of the present invention. Meanwhile, the registration and matching service **20** stores the unique identification code and its IP address in its internal database for subsequent processing.

[0017] Now turning to FIG. **2**, it shows a flow chart of the surveillance system in an exemplary embodiment. Step **28** refers to the situation that the monitoring device **26** is set up and is connected to the Internet **50** and the registration and matching service **20** is set up to provide registration and matching service. The surveillance system is said to be initialized and is ready to use. When a user plugs the external storage device **24** into the computing device **22**, the built-in program in the external storage device **24** is automatically loaded to the computing device **22** and executed. The built-in program stores the same URL of the registration and matching service **20** and goes through the same process as the monitoring device **26** to automatically connect to the registration and matching service **20** (step **30**). Once connected, the registration and matching service **20** stores the IP address of the computing device **22** for subsequent matching operation. In one embodiment, the registration and matching service **20** has a record that stores the visiting history of the external storage device **24**. If it is first time the user uses the surveillance system, the user will be automatically directed to step **32** to perform user registration. In another embodiment, the user enters the URL of the website manually so as to access to the website for registration. During first time registration, the user is prompted to input the unique identification code of the monitoring device **26** so that the registration and matching service **20** can perform matching between the computing device **22** to which the external storage device **24** is connected and the monitoring device **26**.

[0018] In one embodiment, the registration and matching service **20** creates a username and password for the user under registration. The user can choose to save the username and password in the external storage device **24** or not. When the registration is done, step **34** is entered. In one embodiment, the registration and matching service **20** uses the unique identification code of the monitoring device as the key to identify the IP address of the monitoring device. It then creates a new record on a mapping table. In one embodiment, the record comprises the username, unique identification code and the IP address of the monitoring device, and the IP address of the external storage device. Afterwards, step **34** is entered. The registration and matching service **20** will distribute the IP addresses of the computing device **22** to which the external storage device **24** is connected and the monitoring device **26** to each other. In another embodiment, the unique identification code is also sent and stored in the external storage device **24**. Afterward, the computing device **22** to which the external storage device **24** is connected and the monitoring device **26** will be disconnected from the registration and matching service **20** in step **36**. Finally in step **38**, the computing device **22** to which the external storage device **24** is connected and the monitoring device **26** will automatically establish a unique pairing between them (i.e. direct connection/communication), as they know each other's IP address. The unique pairing, in an exemplary embodiment, is a peer-to-peer connection. It is guaranteed that peer-to-peer connection is always successful if the distributed IP addresses are correct. Thus customer service may not be needed after sale. Once the P2P (peer-to-peer) connection is established, the user can monitor the second location from the first location.

[0019] The registration process (step **32**) needs to be done only once. Referring to FIG. **2** again, when in another session the user plugs the external storage device **24** into the computing device **22**, the latter will execute the build-in program to connect to the registration and matching service **20** (step **30**) as before. In one embodiment, the registration and matching service **20** prompts the user to enter a password for verification if the user has not saved his password in the external storage device **24**. If the password is saved previously, the verification will be done automatically. The registration and matching service **20** can then use the username to retrieve the unique identification code of the remote device that the external storage device **24** should associate with and perform the same pairing process as described previously in step **34**. Afterwards, steps **36** and **38** are executed to establish a new P2P session. The user can insert the external storage device **24** to a second computing device **22** that is different from the first one, and the P2P pairing can still be established—without the need for the user to install program or register again. On the other hand, the monitoring device **26** can also be used in any locations without the need of setting up since the built-in program thereof will automatically initiate connection to the registration and matching service **20**. Both the external storage device **24** and the monitoring device **26** are plug-and-play devices that work at any locations.

[0020] In yet another embodiment, the external storage device **24** has sufficient space to store all data generated by the surveillance system. The monitoring device **26**, in one embodiment, is capable of recording video in the format of H.264 and audio and sending the recorded data to the external storage device for viewing or saving once the unique pairing is established. Since all user data and system data are stored in the external storage device **24**, no data will be left in the computing device **22** once the external storage device **24** is removed. This is advantageous as the user may insert the external storage device **24** to any computing device, including those in the public domain, without worrying that some pri-

vate data is left on that computer. Thus, the security level is higher and personal privacy can be protected in the present invention.

[0021] Normally, firewall settings from Internet Service Providers (ISP) allow data packets to go through from user end to a web site server. Subsequent replies from server are allowed too. Since the monitoring device **26** and the computing device **22** initiate data communication to the registration and matching service **20**, subsequent data exchange will not be blocked by firewall(s). In some situation, routers from ISP may perform network address translation (NAT). However, the web server still receives an IP address that can uniquely identify the sender. In some cases, a port number is appended to the IP address too.

[0022] In one embodiment, additional features can be added to the monitoring device **26** based on the user's needs. For instance, temperature sensor, motion sensor, humility sensor, reminder unit, alarm and speaker, etc, can be added to the monitoring device **26** so that two-way interaction/communication can be achieved between the first location and the second location. Therefore, the present invention is not limited to be a surveillance system but also an interaction/communication system based on the user's need and intention.

[0023] In another embodiment, the external storage device **24** is a programmable device so that additional functions can be included based on the user's requirement. The built-in program in the external storage device **24** can control all the settings and configurations within the surveillance system.

[0024] In yet another embodiment, the built-in program in the external storage device **24** can monitor several monitoring devices at different locations simultaneously. In addition to one to one IP mapping, the present invention is capable of one to many IP mappings if the network bandwidth is large enough. And any combination of the functions and features mentioned above is feasible by incorporating them to the built-in program. The user can monitor a first location, interact with a second location and communicate with a third location, etc, simultaneously.

[0025] In an exemplary embodiment, the present invention is used as a baby monitoring system. The parents install the monitoring device **26** in a baby room and then they can monitor their baby at any location such as a Café as long as there is a computing device connected a suitable data communication network. Other devices can also be installed at the monitoring device side, for example speaker, so that the parents can talk with their baby.

[0026] In another exemplary embodiment, the present invention is used as an elderly monitoring and alarm system. The family members can monitor and check the health conditions of the elderly, e.g. temperature, humility by adding preferred features to the monitoring device **26**. Meanwhile, the present invention can act as an alarm system. For instance, if the system detects that the temperature is below a certain limit, a reminder will be sent to pagers, or mobile phones of the family members so that they can attend to the need of the elderly. Motion detector can also be added to warn the family members if there is no movement detected within a long period of time. Reminder unit can be provided as well to reminder the elderly to do certain things such as taking medicine. Safety alarm is another useful function that can be included in the system. The user can input several emergency contact numbers (phone number of family members, emergency hotline, etc) so that warning message will be sent when the elderly initiate the alarm system.

[0027] The exemplary embodiments of the present invention are thus fully described. Although the description referred to particular embodiments, it will be clear to one skilled in the art that the present invention may be practiced with variation of these specific details. Hence this invention should not be construed as limited to the embodiments set forth herein.

[0028] For example, the external storage device **24** can be any type of electrical devices which are capable of storing information on a non-volatile memory such as USB storage, portable hard disk, memory card (e.g. SD/MS) or Solid State Drive (SSD) with built-in programs, etc. Also, the monitoring device can be a camera, image sensor, audio microphone, motion sensor etc, or a combination thereof.

[0029] Moreover, the aforesaid embodiments only use one unique identification code in the monitoring device **26** for registration. It is also feasible to use an external storage device with one unique identification code but a camera with no identification code with some programming changes on both devices. In addition, using the unique identification codes of both the external storage device **24** and the monitoring device **26** for registration is another feasible approach that is less complex. Furthermore, the video format needs not to be H.264 only as mentioned in one embodiment. Other formats like AVI, RMVB, FLV, etc, are also workable. The formats of the captured image can be JPEG, BMP, TIF, etc and the formats of the audio can be MP3, WAV, AAC, etc.

[0030] The aforesaid embodiments disclose the scenario that a user first connects the monitoring device **26** to the Internet **50**, and then inserts the external storage device **24** to the computing device **22**. This sequence is not essential. Those skilled in the art, based on the teaching of this invention, can develop variants of aforesaid operational procedures to establish the P2P pairing with one-time registration only. As an example, the role of the monitoring device **26** and the external storage device **24** may be reversed. Moreover, the external storage device **24** may store the unique identification code of the monitoring device in its memory after the first registration and send it to the registration and matching service **20** for matching when it is required to re-establish the P2P connection in a different session. In this scenario, there is no need for the user to enter his username to the web site in order to re-establish P2P connection.

[0031] In another variation implementation, the external storage device **22** and computing device **22** may be combined as a single device, such as a desk-top computer, a mobile phone or a data tablet that are capable of connecting to a suitable data communication network.

[0032] While Internet **50** is used throughout various embodiments to illustrate the inventive ideas, the present invention can also be realized in any other data communication network with similar capability. Those skilled in the art can adapt the invention ideas disclosed here to many other types of wired or wireless network and it will still be within the scope of this invention.

1. A system for surveillance comprising:

a) an external storage device connected to a computing device; said external storage device being capable of exchanging data with a registration and matching service via said computing device through a data communication network; and

b) a monitoring device; said monitoring device being capable of exchanging data with said registration and matching service via said data communication network;

wherein said registration and matching service receives at least one unique identification code from said external storage device and said monitoring device and uses it to establish a unique pairing between said external storage device and said monitoring device; said unique pairing being stored in at least one of said external storage device and said monitoring device so that subsequent data exchange between them can be directly established using said unique pairing without the need of re-registration.

2. The system according to claim **1**, wherein said data communication network is Internet, said registration and matching service is hosted by a web server with a unique URL and said external storage device further comprises a built-in program; said build-in program is loaded and executed when said external storage device is connected to said computing device, causing said computing device to connect to said URL.

3. The system according to claim **2** wherein said at least one unique identification code is selected from a group consisting of (a) said external storage device, (b) said monitoring device and (c) a combination thereof and said at least one unique identification code is sent by the respective device to said web server that hosts said registration and matching service.

4. The system according to claim **3** wherein said registration and monitoring service further comprises a software module that receives an IP addresses of said external storage device and said monitoring device, and prompts a user to enter said at least one unique identification code of said external storage device and said monitoring device; said software module further uses said at least one unique identification code to establish the unique pairing between said IP addresses of said external storage device and said IP address of said monitoring device.

5. The system according to claim **4** wherein once said unique pairing is established, said registration and matching service performs one of the actions selected from:

I. sending said IP address of said monitoring device to said external storage device;

II. sending said IP address of said computing device to said monitoring device; and

III. a combination thereof;

so that said external storage device establishes direct communication with said monitoring device for subsequent data exchange.

6. The system according to claim **4** wherein said software module records a registration history of said external storage device and said monitoring device so that when said external storage device connects to a second computing device, said software module uses said registration history to establish said unique pairing between said external storage device and said monitoring device.

7. The system according to claim **1** wherein said external storage device is selected from a group consisting of

I. a USB storage device;

II. a memory card;

III. a portable hard disk; and

IV. a solid state drive.

8. The system according to claim **1** wherein said monitoring device is selected from a group consisting of

I. a video camera;

II. an audio unit capable of outputting and inputting audio signal;

III. a motion detector;

IV. a temperature sensor;

V. an alarm unit;

VI. a reminder unit;

VII. a humility sensor; and

VIII. any combination thereof.

9. The system according to claim **8**, wherein said monitoring device is capable of two-way interaction.

10. The system according to claim **2**, wherein said built-in program is capable of controlling all settings and configurations within said system.

11. The system according to claim **2**, wherein said external storage device saves all data generated by said system.

12. The system according to claim **1**, wherein said monitoring device is capable of adding additional features based on the user's need.

13. The system according to claim **1**, wherein said unique identification code is the serial number of said monitoring device.

14. A method for surveillance comprising the steps of:

a) linking an external storage device via a computing device to a registration and matching service through a data communication network;

b) connecting a monitoring device to said registration and matching service via said data communication network;

c) receiving at least one unique identification code from said external storage device and said monitoring device;

d) establishing a unique pairing between said external storage device and said monitoring device based on said at least one unique identification code; and

e) storing said unique pairing in at least one of said external storage device and said monitoring device

so that subsequent communication between said external storage device and said monitoring device can be directly established using said unique pairing without the need of re-registration.

15. The method according to claim **14** wherein said data communication network is Internet, said registration and matching service is hosted by a web server, and said receiving step further comprises the steps of:

I. receiving at least a first unique identification code sent by said external storage device and said monitoring device;

II. prompting a user to enter at least a second unique identification code.

16. The method according to claim **14** wherein said establishing step further comprises the steps of:

I. identifying a match between said first unique identification code and said second unique identification code; and

II. pairing of the IP address of said monitoring device to the IP address of said computing device when said match is found.

17. The method according to claim **16** wherein said pairing step further comprises performing one of actions selected from:

I. sending said IP address of said monitoring device to said external storage device;

II. sending said IP address of said computing device to said monitoring device; and

III. a combination thereof;

so that said external storage device establishes direct communication with said monitoring device for subsequent data exchange.

18. The method according to claim **16** further comprising the steps of

I. storing said at least the first unique identification code in an internal database when said pairing is first established in said establishing step;

II. re-constructing said pairing of IP address when said external storage device is connected to a second computing device by performing the steps outlined in claim **16** when the second unique identification code is provided.

19. The method according to claim **14** further comprises saving all data in said external storage device.

20. The method according to claim **14** further comprises adding additional features to said monitoring device based on the user's need; said additional features is selected from a group consists of:

I. sensing the temperature of an entity by a temperature sensor;

II. detecting movement by a motion detector;

III. receiving and outputting audio signal;

IV. generating alarms and reminders; and

V. any combination thereof.

* * * * *